

*Card-Cage with Integrated Control and Shaping of Flow Resistance  
Curve for Multiple Plenum Chambers*

1. In a digital data processor chassis of the type having a slot for slidable insertion of a circuit board, the improvement wherein a slot comprises  
  
a first air flow aperture disposed adjacent a location of a first edge of the inserted circuit board, the first air flow aperture comprising an air flow source,  
  
a second air flow aperture disposed adjacent a location of a second edge of the inserted circuit board, the second air flow aperture comprising an air flow exit.
2. In the digital data processor of claim 1, the improvement wherein the chassis comprises a cabinet with an air flow inlet.
3. In the digital data processor of claim 2, the improvement wherein the air flow inlet provides to the first air flow aperture cooling air flow drawn from an environment outside the cabinet.
4. In the digital data processor of claim 3, the further improvement wherein the second air flow aperture provides air flow to any of the environment outside the chassis or a region within the cabinet.
5. In the digital data processor of claim 1, the further improvement wherein any of the first and second apertures are sized so that the impedance to air flow to the circuit board inserted in the slot substantially matches that to one or more other boards in the chassis.
6. In the digital data processor of claim 1, the further improvement wherein any of the first and second apertures are sized so that the impedance to air flow to the circuit board inserted in the slot is sized in relation that to one or more other boards in the chassis.
7. In the digital data processor of claim 1, the further improvement wherein the chassis is any of a vacuum or dip brazed.
8. A card cage for a digital data processor, comprising a plurality of slots for circuit boards, each slot comprising

an upper guide that receives an upper portion of a respective circuit board, the upper guide having one or more air flow apertures disposed adjacent a location of an upper edge of the respective circuit board,

a lower guide that receives a lower portion of a respective circuit board, the lower guide having one or more air flow apertures disposed adjacent a location of an lower edge of the respective circuit board,

the one or more apertures of the upper or lower guide comprising an air flow source, the one or more apertures of the other guide comprising an air flow exit.

9. A card cage of claim 8, the further improvement wherein the card cage is brazed.
10. A card cage of claim 9, the further improvement wherein the card cage is any of vacuum or dip brazed.
11. A card cage of claim 8, wherein a first slot and a second slot are arranged to be disposed on opposing sides of an air flow source.
12. A card cage of claims 8, wherein the air flow apertures of a slot are sized so that impedance to air flow to the respective circuit board any of substantially matches or is sized in relation to that to one or more other circuit boards.
13. A digital data processor comprising

a chassis comprising a covering and a plurality of slots for circuit boards,

each slot comprising

an upper guide that receives an upper portion of a respective circuit board, the upper guide having one or more air flow apertures disposed adjacent a location of an upper edge of the respective circuit board,

a lower guide that receives a lower portion of a respective circuit board, the lower guide having one or more air flow apertures disposed adjacent a location of an lower edge of the respective circuit board,

the one or more apertures of the upper or lower guide comprising an air flow source, the one or more apertures of the other guide comprising an air flow exit.

at least a first and second ones of the slots being disposed on opposing sides of an air flow inlet provided in the chassis covering.

14. The digital data processor of claim 13, wherein  
  
at least a selected circuit board comprises a plenum,  
  
the air flow apertures of a slot in which the selected circuit board is inserted are arranged to pass air flow through the plenum.
15. The digital data processor of claim 14, wherein at least a selected circuit board comprise  
  
a substrate and one or more circuit components thereon, and  
  
a cover affixed to the circuit board, a plenum being defined in a region between the cover and the circuit board.
16. The digital data processor of claim 14, wherein the air flow apertures of a slot in which the selected circuit board is inserted are arranged to pass air flow through the plenum.
17. The digital data processor of claim 13, wherein at least one of the slots provides an air-tight junction with the respective circuit board.
18. The digital data processor of claim 13, the further improvement wherein the card cage is brazed.
19. The digital data processor of claim 13, the further improvement wherein the card cage is any of vacuum or dip brazed.
20. The digital data processor of claim 13, wherein the air flow inlet is centrally disposed on the chassis covering.

21. The digital data processor of claim 13, comprising a fan that any of pulls an pushes air through the chassis.